**Homework 04.**

In this assignment you will have a chance to see how probability is used in the real-world.

**Assigned: 19 September 2017**

**Due: 5:00PM PST, 26 September 2017**

**Instructions: There are ten multiple choice questions. To receive credit, EMAIL your solution by the deadline to** [**tony\_statman@yahoo.com**](mailto:tony_statman@yahoo.com) **according to the following instructions:**

* The SUBJECT LINE must be “**GSBA545 HW04 for [Last name, First name] –** “ and then the ten letters corresponding to your answers; so, for example, if your name were John Doe, and you believed the answers were ABCCDCABED, then the subject line of the email must be “**GSBA545 HW04** for **Doe, John - CABEDABCCD**”
  + The first six characters (**GSBA545**) do not have a space between “GSBA” and “545”
  + The ten characters of your answer should have **no spaces in between**
  + If you submit less than 10 letters, it is assumed that the first letter corresponds to your answer to the first question, etc.
* The FIRST LINE of the body of the email should be your last name, your first name, and your student ID
* The SECOND LINE of the body of the email should be five letters, corresponding to the answers to the five questions (make sure your answer consists of five characters)

**For example, a typical email might be**

From: John Doe <john.doe@usc.edu>

To: tony\_statman <tony\_statman@yahoo.com>

Subject: GSBA545 HW04 for Doe, John - ACEDBADBED

DOE, JOHN 123456789  
ACEDBADBED

In 1998, Emily Rosa et al. published an article in JAMA “investigat[ing] whether TT [Therapeutic Touch] practitioners can actually perceive a ‘human energy field.’ … practitioners … were tested under blinded conditions to determine whether they could correctly identify which of their hands was closest to the investigator’s hand. Placement of the investigator’s hand was determined by flipping a coin.” If TT practitioners could not detect a human energy field, their chance of guessing correctly would have been 0.5.

1. What would the null hypothesis here be?
2. The chance of guessing correctly > 50%
3. TT practitioners can not reliably detect a human energy field
4. The chance of guessing correctly = 50%

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| 1. (i) only | 1. (ii) only | 1. (iii) only | 1. (ii) and (iii) | 1. (i) and (ii) |

1. A total of 280 trials were conducted. What is the smallest number of correct guesses that would have to be made in order to provide “statistically significant” (p < 0.05) evidence that practitioners could detect a human energy field?

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| 1. 146 | 1. 155 | 1. 163 | 1. 168 | 1. 173 |

1. The practitioners actually made a total of 123 correct guesses. If practitioners were guessing at random, what is the chance that they would make 123 or more correct guesses in 280?

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| 1. 2.4% | 1. 4.8% | 1. 43.9% | 1. 56.1% | 1. 97.6% |

1. Fill in the blank: if practitioners had a 90% chance of being able to detect a human energy field, there is a 99% chance that they would have made \_\_\_ or more correct guesses in 280.

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| 1. 121 | 1. 240 | 1. 245 | 1. 259 | 1. 279 |

1. What is the most reasonable conclusion to draw from this experiment?
2. There is statistically significant evidence (p = 2.4%) that a human energy field exists.
3. The results show statistically significant evidence in favor of a human energy field (p = 2.4%), but it is likely that the statistically significant results were due to luck.
4. The results provide statistically significant evidence that the probability of guessing correctly is exactly 50.0%.
5. The results indicate that the probability of guessing correctly could be 50.0% or even lower.
6. The results are not statistically significant, which means there is chance of guessing correctly must be 50.0% or higher.

In August 2017, the Annenberg Public Policy Center asked the equivalent of a simple random sample of 705 U.S. adults the following: “Would you mind naming any of (the three branches of government)?” The equivalent results are summarized below.

* 183 named all three branches
* 92 named two of the three branches
* 190 named one branch
* 233 could not name any branches
* 7 refused to answer

1. What is a 95% confidence interval for the percentage of all U.S. adults who could not name a single branch of government?
2. 30% to 36%
3. 28% to 38%
4. 23% to 29%
5. 35% to 43%
6. What is the correct interpretation of your answer in #6?
7. 95% of randomly drawn samples will give 95% confidence intervals that equal to the interval given in #6.
8. There is a 95% chance that the sample average is in the interval given in #6.
9. There is a 95% chance that the population average is in the interval given in #6.
10. 95% of randomly drawn samples will have confidence intervals that contain the population average.
11. 95% of all populations will have averages that fall in the interval given in #6.
12. A political scientist believes that at least half of U.S. adults can name at least two branches of government. What is the (one-sided) p-value for testing that hypothesis?

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| 1. 10–9 | 1. 10–37 | 1. 0.004 | 1. 0.486 | 1. 0.08 |

1. What is the correct interpretation for the p-value in #8?
2. Since p > 0.05, fail to reject H0, and conclude that at least half of U.S. adults can name at least two branches of government.
3. Since p < 0.05, reject H0, and conclude that at least half of U.S. adults can name at least two branches of government.
4. Since p < 0.05, reject H0, and conclude that less than half of U.S. adults can name at least two branches of government.
5. Since p > 0.05, reject H0, and conclude that the percentage of U.S. adults who can name at least two branches of government might be greater than 50% or might be less than 50%
6. Since p < 0.05, fail to reject H0, and conclude that the percentage of U.S. adults who can name at least two branches of government must not be exactly equal to 50%.
7. Suppose five of the 705 adults are picked at random (without replacement) for more in-depth interviews. What is the chance that everyone in the sample will be able to name all three branches of government?

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| 1. 0.113% | 1. 1.13% | 1. 0.00113% | 1. 22.1% | 1. 77.9% |